SIMPLE INTEREST AND COMPOUND INTEREST

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1) The simple interest on a certain sum of money at the rate of 4% PA for 5 years in RS. 1680. At what rate of the same amount of interest can be received on the sum after 4 years?

a) 5% b) 6% c) 7% d) 8%.

Principal Ammount = x

R.O.I = 4%.

Time = 5 years.

SI = RS. 1680

$SI = \frac{PRT}{100}$

$1680 = \frac{x \times 4 \times 5}{100} \Rightarrow 1680 = \frac{20x}{5} \Rightarrow x = 1680 \times 5$

$x = 8400$

PRINCIPAL AMMOUNT = 8400.

NOW T = 4 years, SI = 1680

R = ?

$SI = \frac{PRT}{100}$

$1680 = \frac{8400 \times R \times 4}{100} \Rightarrow 1680 = 336R \Rightarrow R = \frac{1680}{336} \Rightarrow R = 5$

2) The interest on a certain deposit at 4.5% P.A. is RS. 405 in one year. How much will the additional interest in one year be on the same deposit at 5% P.a?

a) RS. 50 b) RS. 45 c) RS. 40.5 d) RS. 48.5

S.I = 405 R = 4.5 T = 1

$S.I = \frac{PRT}{100}$

$P = \frac{SI \times 100}{R \times T} \Rightarrow P = \frac{405 \times 100}{4.5 \times 1} = \frac{40500}{4.5} \Rightarrow 9000 = P$

NOW R = 5

$S.I = \frac{PRT}{100}$

$S.I = \frac{9000 \times 5 \times 1}{100} \Rightarrow 450 = S.I$ at 5%.

DIFFERENCE IN INTERES = 450 - 405 = 45 RS

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3.) MR. Govind invested an amount of RS. 13900 divided in two different schemes S1 and S2 at the simple interest rate of 14% P.a and 11% P.a respectively. If the total amount of simple interest earned in two years was RS 3508, what was the amount invested in Scheme S2.

a.) RS. 6400 b.) RS. 6500 c.) RS. 7200 d.) RS. 7500

Investment on S1 = x

$SI = \frac{PRT}{100}$

$\frac{x \times 14 \times 2}{100}$ +

Investment on S2 = $(13900 - x)$

$SI = \frac{PRT}{100}$

$\frac{(13900 - x) \times 11 \times 2}{100} = 3508$

$\frac{28x}{100} + \frac{(13900 - x)22}{100} = RS.3508$

$28x - 22x + 3,05,800 = 3508 \times 100$

$= 3,50,800 - 3,05,800$

$6x$

$6x = 45,000$

$x = 7500$

Sum Invested in S2 = $13900 - 7500 = 6400$.

4.) A sum of money was invested in a bank at 8% S.I P.A for 3 years. Instead had it been invested in mutual fund at 8.5% P.A simple interest for 4 years., The earning would have been RS. 500 more. What is the Sum invested.

a.) RS. 4500 b.) RS. 5000 c.) RS. 3500 d.) RS. 5500

R.O.I = 8% T = 3 years → BANK

MUTUAL FUND IS BELOW

R.O.I = 8.5% T = 4 years

S.I OF BANK = $\frac{P \times R \times T}{100} = \frac{x \times 8 \times 3}{100} = \frac{24x}{100}$

S.I OF MUTUAL FUND = $\frac{P \times R \times T}{100} = \frac{x \times 8.5 \times 4}{100} = \frac{34x}{100}$

$\frac{34x}{100} - \frac{24x}{100} = 500$

$\frac{10x}{100} = 500$

$x = \frac{500 \times 100}{10} = 5000$

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5.) A person borrowed RS.600 @ 3% per annum S.I and R.S800 @ 4 1/2 % per Annum on the agreement that the whole sum will be returned only when the total interest becomes RS.246. The number of years, after which the borrowed sum is to be returned is,

a.) 2 years b.) 3 years c.) 4 years d.) 5 years.

Time Period = x

$$\frac{600 \times 3 \times x}{100} + \frac{800 \times 9 \times x}{2 \times 100} = 246$$

$18x + 36x = 246$

$54x = 246$

$x = 4$ years

6) A sum of RS.13000 is divided into three parts such that the simple interests accrued on them for two, three, four years respectively may equal. Find the amount deposited for 4 years?

a) 5000 b.) 6000 c.) 4000 d.) 3000

x, y, z = Ascending order value

$4x = 3y = 2z = K$

L.C.M of 4, 3, 2 = 12.

3000 : 4000 : 6000

The amount deposited for 4 years is 3000

7.) A sum of RS.100 is lent at simple interest of 3% P.A for the first month, 9% P.A for the second month 27% P.A for the third month and so on. what is the total amount of interest earned at the end of year approximately.

a) RS. 797160 b.) RS. 791160 c.) RS. 65390 d.) RS. 66430

$$I = \frac{P}{100} \times 1\left[\frac{3}{12} + \frac{9}{12} + \cdots + \frac{3^{12}}{12}\right]$$

$$I = \frac{1}{12}(3 + 9 + \cdots 3^{12})$$

$P = 100$

$$I = \frac{100}{100} \times \frac{1}{12}\left[\frac{3(3^{12} - 1)}{3 - 1}\right]$$

$$I = \frac{531440 \times 3}{12 \times 2}$$

$I = RS.\ 66430$

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8.) If the simple interest on a sum of money at twelve percent per annum for two years is RS.3800, compound interest on the same sum for the same period at the same Rate of Interest is.

a.) RS.4028 b.) RS.4100 c.) RS.4128 d.) RS.4228

Compound Interest

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

A = final AMOUNT
P = principal
r = rate of Interest
t = time period elapsed
n = no.of.times interest applied per time period.

$S.I = \frac{PRT}{100}$

$3800 = \frac{P \times 12 \times 2}{100}$

$\frac{3800 \times 100}{24} = P$

$P = \frac{380000}{24}$

$P = 15,833.3$

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

$A = 15,833.3\left(1 + \frac{12}{100}\right)^{2}$

$A = 15,833.3\left(\frac{112}{100}\right)^{2}$

$A = 15,833.3\,(1.12)^2$

$A = 15,833.3 \times 1.2544$

$A = 19,861.3352$

A - P = 4028

(OR)

S.I for 2 years = 3800
S.I for 1 year = 1900
C.I for 1900 - $1900 \times \frac{12}{100}$ $\Rightarrow$ 228

C.I for two years = 3800 + 228 = 4028.

9.) A sum of money is borrowed and paid back in two annual installments of RS.882 each allowing 5% of compound Interest. The sum borrowed was.

a.) RS.1620 b.) 1640 d.) 1680 dp. 1700

Present worth of RS.x due in T years = $\frac{x}{\left(1 + \frac{R}{100}\right)^{T}}$

$= \frac{882}{\left(1 + \frac{5}{100}\right)^{2}} \Rightarrow \frac{882 \times 100 \times 100}{105 \times 105} \Rightarrow 2^{nd}$ year

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1st year = $\frac{882}{105\left(1+\frac{15}{100}\right)} \Rightarrow \frac{882\times100}{105}$

1st year + 2nd year

$\frac{882\times\overset{20}{\cancel{100}}}{\underset{21}{\cancel{105}}} + \frac{\overset{20}{\cancel{882}}\times\overset{20}{\cancel{100}}\times\overset{20}{\cancel{100}}}{105\times\underset{21}{\cancel{105}}}$

$\frac{17640}{21} + \frac{352800}{441}$

$\frac{370440 + 352800}{441}$

$\frac{723,240}{441}$

1,640

10) Rakesh invested an amount of RS. 12000 at the rate of 10%. Simple interest and and another ammount at rate of 20% simple Interest. The total Interest earned at the end of one year on the ammount invested became 14 P.c P.A. Find total ammount invested.

a) RS. 20000 b) RS. 22000 c) RS. 24000 d) 25000

$\frac{12000\times10\times1}{100} + \frac{x\times20\times1}{100} = \frac{(12000+x)\times14\times1}{100}$

$\frac{120000}{100} + \frac{20x}{100} = \frac{168000+14x}{100}$

$120000 + 20x = 168000 + 14x$

$20x - 14x = 168000 - 120000$

$6x = 48000$

$x = 8000$

TOTAL AMOUNT INVESTED: 12,000 + 8000 = 20,000

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11.) The rate of simple interest in two banks is in the ratio of 4:5. Amith wants to deposit his total saving in these two banks in such a way that he should recieve equal half yearly interest from both. He should deposit his saving in the banks in the ratio of :

a) 2:5 b) 5:4 c) 5:3 d) 4:5

A & B are Banks' Amount Invested (differently)

~~A × 4 × 1/2 × 1/100 = B × 5 × 1/2 × 1/100~~

~~x : y = 5 : 4~~

Interest rate in A = 5 R
Interest rate in B = 4 R

$I = \frac{PRT}{100}$

$A \times 5R \times \frac{1}{2} \times \frac{1}{100} = B \times 5R \times \frac{1}{2} \times \frac{1}{100}$

~~5A = 5B~~

$4A : 5B$

$A/B = 5/4$

$A : B = 5 : 4$

12.) A Sum of money becomes triple itself in 16 years. In how many years will it become 5 times at the same rate?

a) 32 b) 15 c) 27 d) 30

Case I =

P = 100
amt = 300
SI = 300 - 100 = 200
t = 16 years.

$S.I = \frac{PRT}{100}$

$\frac{S.I \times 100}{PT} = R$

$R = \frac{200 \times 100}{100 \times 16}$

R = 12.5 %.

CASE II =

P = 100
amt = 500
SI = 500 - 100 = 400
t = ? , R = 12.5

$T = \frac{S.I \times 100}{P \times R}$

$T = \frac{400 \times 100}{100 \times 12.5}$

T = 32 years

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13.) The compound Interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period in years is:

a) 2 b) 2 ½ c) 3 d) 4

$P = 30,000 \quad R = 7\% \quad C.I = 4347$

$34347 \Rightarrow 30,000 + 4347$

$34347 = 30,000 \left[1 + \frac{7}{100}\right]^n$ time be n years

$34347 = 30,000 \left[\frac{107}{100}\right]^n$

$\frac{34347}{30,000} = \left[\frac{107}{100}\right]^n$

$\frac{11449}{10,000} = \left(\frac{107}{100}\right)^2$

$n = 2$

14.) At what rate of C.I per Annum will a sum of Rs. 1200 become Rs. 1348.32 in 2 years?

a) 6% b) 6.5% c) 7% d) 7.5%

$1200 \times \left(1 + \frac{R}{100}\right)^2 = 1348.32$

$\left(1 + \frac{R}{100}\right)^2 = \frac{1348.32}{1200}$

$\left(1 + \frac{R}{100}\right)^2 = \frac{134832}{120000} = \frac{11,236}{10,000}$

$\left(1 + \frac{R}{100}\right)^2 = \frac{11,236}{10,000} \Rightarrow \frac{106}{100} = \left(1 + \frac{R}{100}\right)$

$R = 6\%$

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15.) If the simple interest on a sum of money for 2 years at 5% per annum is RS.50, what is the compound interest on the same at the same rate and for the same time?

a) RS.52 b) RS.51.25 c) RS.54.25 d) RS 60.

S.I = 50, R = 5%, T = 2 years

$S.I = \frac{PRT}{100}$

$50 = \frac{P \times 5 \times 2}{100}$

$P = \frac{50 \times 10}{1}$

$P = 500$

C.I of 500 RS

$Amt = 500 \times \left(1 + \frac{5}{100}\right)^2$

$= 500 \left(\frac{105}{100}\right)^2$

$= 500 \times \frac{21}{20} \times \frac{21}{20}$

$= 551.25$

C.I = 551.25 − 500

C.I = 51.25 RS

16.) Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on RS. 4000 for 2 years at 10% per annum. The sum placed on simple interest is.

a) RS. 1550 b) RS. 1650 c) RS. 1750 d) RS. 2000

P = 4000, t = 2 years R = 10%.

$C.I = P \times (1+r)^n - P$

$I = 4000 \times \left(1 + \frac{10}{100}\right)^2 - 4000$

$I = 4000 \times \left(\frac{11}{10}\right)^2 - 4000$

$I = 400 \times \frac{121}{10} - 4000$

$I = 4840 - 4000$

$I = 840$

As per question

$S.I = \frac{840}{2} = 420$

$420 = \frac{PRT}{100}$

$420 = \frac{P \times 8 \times 3}{100}$

$\frac{420 \times 100}{24} = P$

$P = \frac{42000}{24}$

P = 1750

17.) If the anual rate of S.I increases from 10% to 12.5%. Then a man's yearly income from an investment increases by 1250. His Principle Amount is.

a) 45,000 b) 50,000 c) 60,000 d) 65,000

$S.I = \frac{PRT}{100}$ ⇒ P = x

$\frac{x \times 25}{2 \times 100} - \frac{x \times 10}{100} = 1250$

$x\left(\frac{25-20}{200}\right) = 1250$

$\frac{5x}{200} = 1250$

$x = \frac{1250 \times 200}{5}$ ⇒ x = 50,000

18) Raghav borrows RS. 2550. to be paid back with compound interest at the rate of 4% per annum by the end of 2 years in two equal yearly instalments. How much will be each installment?

a) RS. 1275 b) RS. 1283 c) RS. 1352 d) RS. 1377

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Method 1 =

$A = 2250$, $R = 4\%$, $n = 2$ years, Installment $= y$

$$\text{Present worth} = \frac{\text{Instalment}}{\left[1 + \frac{r}{100}\right]^n}$$

$$P_1 = \frac{y}{\left[1 + \frac{4}{100}\right]^1}$$

$$P_1 = \frac{y}{\left[1 + \frac{1}{25}\right]}$$

$$P_1 = \frac{y}{\frac{26}{25}}$$

$$P_1 = \left(\frac{25}{26}\right) y$$

$$P_2 = \left(\frac{25}{26}\right)^2 y = \frac{625}{676} y$$

$$P_1 + P_2 = A$$

$$\frac{25}{26} y + \frac{625}{676} y = 2550$$

$$\frac{(650 + 625) y}{676} = 2550$$

$$\frac{1275}{676} y = 2550$$

$$y = 2550 \times \frac{676}{1275}$$

$$y = 1352$$

Method 2 =

$P = 2550$, $n = 2$, $r = 4\%$.

$$\text{Each instalment} = \frac{P}{\left(\frac{100}{100+r}\right) + \left(\frac{100}{100+r}\right)^2} = \frac{2550}{\left(\frac{100}{100+4}\right) + \left(\frac{100}{100+4}\right)^2}$$

$$= \frac{2550}{\frac{100}{104} + \left(\frac{100}{104}\right)^2} = \frac{2550}{\frac{100}{104}\left(1 + \frac{100}{104}\right)}$$

$$= \frac{2550}{\frac{100}{104}\left(\frac{204}{104}\right)}$$

$$\text{Each installment} = \frac{2550 \times 104 \times 104}{204 \times 100} = ₹\ 1352.$$

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19.) A man invested an amount of RS. 8000 in a fixed deposit scheme for 2 years at compound interest of 5% per annum. How much amount will albert get on maturity of the fixed deposit?

a) RS. 8600 b.) Rs 8620 c.) RS. 8820 d.) RS 8840

Amount $= 8000 \times \left(1 + \frac{5}{100}\right)^2$

$= 8000 \times \left(\frac{105}{100}\right)^2$

$= 8000 \times \left(\frac{21}{20}\right)^2$

$= \frac{20}{8000} \times 21 \times 21$

Amount $= 20 \times 21 \times 21 = 8820$

20.) The difference between simple interest and compound interest on RS. 1200 for one year at 10% per annum reckoned half yearly is.

a) RS. 2.50 b) RS. 3 c.) RS. 3.75 d.) RS. 4

$P = 1200, \quad R = 10\%, \quad T = 1$ year

$S.I = \frac{PRT}{100} = \frac{1200 \times 10 \times 1}{100} = 120$

For C.I, reckoned half yearly, $P = 1200$, $r = 5\%$ per half year, $n = 2$ half year.

$\therefore C.I = 1200 \times \left(1 + \frac{5}{100}\right)^2 - 1200$

$= 1200 \times \left(\frac{105}{100}\right)^2 - 1200$

$= 1200 \left(\frac{21}{20}\right)^2 - 1200$

$= \frac{63}{1200} \times 21 \times 21 - 1200$

$= 1323 - 1200$

C.I $= 123$

Required difference = RS. 123 − RS. 120 = RS. 3